

Abstract Submitted to the
International Conference on Strongly Correlated Electron Systems
University of Michigan, Ann Arbor
August 6-10, 2001

Cr-Doping Effect on the Perovskite (Nd, Sr)MnO₃ Single Crystals

Jun Takeuchi, Seitaro Hirahara, Tara Prasad Dhakal,
Kiyotaka Miyoshi, Kenji Fujiwara

Department of Material Science, Shimane University, Matsue 690-8504, Japan

The effect of Cr-doping on the Mn site in the perovskite Nd_{1-y}Sr_yMnO₃ (y=0.33, 0.5 and 0.55) single crystals grown by the floating zone method has been studied by using the magnetization, magnetoresistance, thermal expansion and magnetostriction measurements. The material with y=0.33 shows a transition from paramagnetic semiconducting state (PMS) to ferromagnetic metallic state (FMM) at T_C=250 K. Cr-doping up to 6 at.% enhances negative colossal magnetoresistance near T_C. The material with y=0.5 shows successive transitions from PMS to FMM at T_C=260 K and then to antiferromagnetic insulating state (AFMI) with charge ordering at T_N=170 K. The application of 7T magnetic field suppresses the AFMI state keeping the FMM state down to 120K. Cr-doping of 2 at.% completely suppresses the AFMI state keeping the FMM state down to the lowest temperature (10K) measured. The material with y=0.55 shows a transition from PMS to antiferromagnetic state (AFM) at T_N=230 K. Cr-doping of 10 at.% completely changes the AFM state to the FMM state. It is noticeable that small amount of Cr-doping stabilizes the FMM state in all cases, which is probably caused by provoking the double exchange interaction between Mn ions.